PLANT PROTECTION BULLETIN

A Publication of the
WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

VOL. IV, No. 11 AUGUST 1956

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ROME

FAO PLANT PROTECTION BULLETIN

is issued as a medium for the dissemination of information received by the World Reporting Service on Plant Diseases and Pests, established in accordance with the provisions of the International Plant Protection Convention, 1951. It publishes reports on the occurrence, outbreak and control of pests and diseases of plants and plant products of economic significance and related topics, with special reference to current information. No responsibility is assumed by FAO for opinions and viewpoints expressed in the Bulletin.

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The Bulletin is issued monthly in English, French, and Spanish, and twelve numbers, commencing with the October issue in each year, constitute a volume. Subscription rates are $ 3.00 or 15s. per annum; single numbers are priced at $ 0.30 or 1s. 6d. The citation is FAO Plant Protection Bulletin, or, in abbreviation, FAO Plant Prot. Bull.

FAO Plant Protection Bulletin

VOL. IV, No. 11 A Publication of the AUGUST 1956

World Reporting Service on Plant Diseases and Pests

A Status Report on Conditions of Forest Insects in the United States, 1955 [1]

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Highlights

In general, there was a decrease in the scope of infestations and in the severity of tree mortality caused by forest insects in the United States during 1955. The decreases occurred primarily in the Pacific Coast States, and in Alaska, but to some extent also in the Rocky Mountains, and in the South. Elsewhere in the nation tree-damage and tree-killing was moderate, comparable to conditions which have prevailed during the past few years.

The combined action of Federal, State, and private agencies in control of destructive species of forest insects during 1955 averted major loss of timber in many areas. The largest program ever undertaken in a single season for control of the spruce budworm, *Choristoneura fumiferana* (Clem.), was completed successfully on 2,263,000 acres of coniferous forests in Oregon, Idaho, Montana, and New Mexico. Successful control also was undertaken against the Engelmann spruce beetle, *Dendroctonus engelmanni* Hopk., in Idaho, Montana, and Colorado; the southern pine beetle, *Dendroctonus frontalis* Zimm., in the southern and southeastern States; and the gypsy moth, *Porthetria dispar* (L.), in Michigan and in portions of the northeastern States.

[1] This report is based upon information submitted by co-operators, the Federal land-managing agencies, state forestry and conservation organizations, lumber companies, timber operators, and private landowners.

Status of Major Insect Pests

DOUGLAS-FIR BEETLE, *Dendroctonus pseudotsugæ* Hopk. There was a sharp reduction in the amount of tree-killing caused by the Douglas-fir beetle in the North Coast forests of California, and epidemic infestations in Oregon and Washington totalled only 873,120 acres as compared to 5,100,000 acres infested in 1954. Heavy tree-killing continued, however, in a portion of western Oregon and in northeastern Washington. The intensity of infestations increased in southern Colorado, in New Mexico, and in many parts of western Montana, Idaho, and Utah. In these latter areas, cumulative tree-killing during the past five years has resulted in a mortality of from 5 to 75 percent of the Douglas-fir stands. The infested trees are being salvaged wherever possible as a means of reducing the severe timber losses caused by this insect.

ENGELMANN SPRUCE BEETLE, *Dendroctonus engelmanni* Hopk. The Engelmann spruce beetle epidemics which have been widespread throughout the Rocky Mountain region for the past several years were terminated during 1955. The infestations in western Montana and northern Idaho now are largely endemic even though a few areas of severe tree-killing remain. One new outbreak was discovered on 9,000 acres in western Wyoming, and a few scattered pockets of beetle activity of lesser acreage are known to exist in parts of Colorado. The infesta-

tions were brought under control by a combination of forces; infested trees were logged from the stands or were sprayed with toxic oils, and natural control factors, including the feeding by woodpeckers, parasitism, and adverse weather, also contributed to the overall decline of the beetle populations.

ALASKA SPRUCE BEETLE, *Dendroctonus borealis* Hopk. An increase in the rate of tree-killing caused by the Alaska spruce beetle was noted in portions of Interior Alaska, particularly in the vicinity of Soldotna and Homer on the Kenai Peninsula where recent road and power line construction has resulted in the creation of large quantities of favorable host material for the insects. *Ips interpunctus* Eichh. is associated with the bark beetle in the infestation and there were countless epidemic pockets of *Ips*-killed trees throughout the Yukon-Porcupine-Coleen-Chandler River country. Some of the damage caused by *Ips* has been prevalent in these areas for a number of years, a probable cause being that populations have increased in fire-weakened trees.

MOUNTAIN PINE BEETLE, *Dendroctonus monticolæ* Hopk. The mountain pine beetle is a destructive enemy of several species of pines in the western United States. Lodgepole pine is one of the preferred host species and the beetles occurred in outbreak proportions in lodgepole stands in several areas in the western States. Approximately 3,000 trees were killed on 1,500 acres in a portion of the Teton National Forest in Wyoming, and 295 centers of heavy tree-killing covering 175,000 acres occurred on the Gifford Pinchot, Wenatchee, and Mount Baker National Forests in Washington, and on the Deschutes National Forest and the Klamath Indian Reservation in Oregon. An infestation of long duration on the Wasath and Ashley National Forests in Utah increased in severity, and a few other local centers of outbreak conditions occurred in portions of northern Idaho. In California, 40,000 trees were killed on 5,400 acres in Yosemite National Park where the host trees had become weakened as a result of defoliation by the lodgepole needleminer, *Recurvaria milleri* Busck. Tree-killing in ponderosa pine was not severe except in one local area at Crystal Bay, near Lake Tahoe, Nevada. The loss in sugar pine was light throughout the range of this tree species and no excessive tree-killing was noted in stands of western white pine. About 200 limber pines were killed on a portion of the Shoshone National Forest in Wyoming. The outbreak area is stocked with limber pine and lodgepole pine but, despite the fact that lodgepole pine is a common host, tree-killing was confined to the limber pine.

WESTERN PINE BEETLE, *Dendroctonus brevicomis* Lec. This insect is the most important enemy of ponderosa pine, and in past years has caused severe tree-killing over large areas in the western United States. Currently, however, infestations are at the lowest level since the turn of the century. There were no serious centers of tree-killing in California, or in the northern Rocky Mountain States. There were, however, 45,320 acres of epidemic infestations recorded in Oregon and Washington, but this is a reduction from some 1,000,000 acres infested in 1953 and 270,000 acres in 1954. Favorable precipitation and normal timber harvesting, with particular attention to the removal of high risk trees from the stands, are steadily reducing the western pine beetle hazard in the western States.

JEFFREY PINE BEETLE, *Dendroctonus jeffreyi* Hopk. This bark beetle is limited in its distribution to the range of Jeffrey pine in the West. In general, tree-killing as a result of attacks by this insect was light although heavier infestations were found on portions of the Inyo National Forest, and to some extent on the Plumas National Forest, in California. The selective removal of high risk trees from the affected areas is proving successful for the control of these infestations.

SOUTHERN PINE BEETLE, *Dendroctonus frontalis* Zimm. Several large-scale outbreaks of this important insect pest occurred in portions of North and South Carolina, Tennessee, Georgia, Alabama, and Mississippi. Unusually dry conditions prevailed in all areas where the bark beetles were troublesome and large-scale programs were necessary to suppress the epidemic infestations. Control measures included salvage cuttings

and the spraying of infested trees with formulated insecticides. Despite concerted control efforts, spot infestations continued to appear in areas surrounding the control units, and in districts as much as 80 miles distant. The critical areas of infestations remaining in the southeastern States are grouped in northern Georgia, eastern North Carolina, western Tennessee, and in portions of Alabama.

SOUTHWESTERN PINE BEETLE, *Dendroctonus barberi* Hopk. This insect, and associated species of bark beetles, *D. convexifrons* Hopk., *D. approximatus* Dietz, and *D. arizonicus* Hopk., increased in numbers and caused severe killing of ponderosa pine in several areas in New Mexico, Nevada, and Arizona. In some cases, there was a heavy depletion of the pine stands, particularly at the lower edge of the forest type. Heavy tree-killing in these areas presumably is related to deficiencies in annual precipitation and a lowering of the vigor of the host trees.

BLACK HILLS BEETLE, *Dendroctonus ponderosæ* Hopk. Although the Black Hills beetle was found in outbreak proportions in some of the ponderosa pine stands throughout the Rocky Mountains, and in the Black Hills of South Dakota, there was a decrease of populations in most areas. Several infestations in Colorado, New Mexico, Wyoming, and South Dakota were controlled by logging the infested trees or by spraying them with toxic oils; there was no recurrence of severe tree-killing in those areas. A severe outbreak, however, has persisted on portions of the Dixie National Forest and at Bryce Canyon National Park in southern Utah since 1949. Although the population has been reduced through the application of direct control measures each year, the combined forces of artificial and natural control have not materially changed the course of the outbreak to date.

BLACK TURPENTINE BEETLE, *Dendroctonus terebrans* (Oliv.). The black turpentine beetle occurred in outbreak proportions in many areas throughout the southern and southeastern States. In each outbreak area, increased beetle activity and resultant damage and death of attacked trees appeared to be associated with timber cutting, turpentining operations, or fires. Small groups of pines were killed by the beetles in several counties in eastern Texas and throughout southern Arkansas. Severe tree damage also occurred on portions of the Homochito and De Sota National Forests in Mississippi; the Kisatchie National Forest in Louisiana; and throughout the Gum Belt in Florida, Georgia, and North Carolina.

PINE ENGRAVER BEETLES, *Ips* spp. Several species of pine engraver beetles seriously affected the coniferous forests throughout the country. In the Pacific Coast States, *Ips confusus* Lec. and *Ips oregoni* Eichh. caused spotty tree-killing in many places, particularly in proximity to areas being logged. The major damage in California occurred in the southern portion of the state; in Oregon and Washington there were 112 centers of damage totalling 51,910 acres in scattered locations. The beetles became noticeably more active in many parts of the southern and southeastern States during the dry weather in September and October. Infestations were particularly severe in eastern Texas, southern Arkansas, southwest Mississippi, and Alabama. Noteworthy of these latter infestations was the unusual aggressiveness of *Ips avulsus* (Eichh.). In many instances, pines were found harboring active populations of this insect without the association of other *Ips* species. Control of *Ips* infestations in the South has been attempted by salvaging infested trees and by spraying infested slash with toxic oils.

FIR ENGRAVER, *Scolytus ventralis* Lec., and silver fir beetles, *Pseudohylesinus* spp. The fir engraver beetle, a serious pest of red and white fir, occurred in epidemic numbers throughout most of the fir stands in California. The rate of tree-killing, however, was somewhat less than was noted during 1954. The severe killing of white fir by this insect in a local area in central New Mexico ended abruptly in 1955 as a result of natural factors. Infestations also declined in the fir stands of Oregon and Washington. Epidemic outbreaks in these two States have been recorded annually along the crest of the Cascade Mountains, and although heavy infestations occurred on 50,080 acres, it was much less than in previous years. There also was

a marked decline in acreage and intensity of *Pseudohylesinus* beetle infestations in the Pacific Northwest and it appears that this long-standing epidemic in Pacific silver fir has almost subsided.

WHITE-PINE WEEVIL, *Pissodes strobi* (Peck). This insect is one of the most important pests affecting pine plantations in the eastern portion of the nation. Although the weevil does not kill the tree, it kills the leader as well as the current growth, and a crooked or forked tree develops. The value of the tree is greatly reduced by the crooks and forks, and volume losses are very high. Weevil damage was severe and more extensive during 1955 than in past years. In many of the white pine and jack pine plantations, 40 percent or more of the trees were "weeviled." Open growing white pine was heavily attacked in many areas and red pine is becoming a common host to the weevil in the Lake States region when damage was high during the year.

PALES WEEVIL, *Hylobius pales* (Hbst.). The pales weevil and two other weevil species, *Pissodes nemorensis* Germ. and *Pachylobius pecivorus* Germ., caused severe damage to seedling pines in the southern states where timber cutting was followed by immediate planting. In addition, severe damage to seedlings occurred in areas that were planted subsequent to fires. It is suspected that weevil damage is more widespread throughout the southern and southeastern States than is known at present.

SPRUCE BUDWORM, *Choristoneura fumiferana* (Clem.). Epidemic populations of the spruce budworm occurred throughout much of the mixed conifer and spruce-fir forests in the Rocky Mountains, in some of the forest areas in the Pacific Northwest, the Lake States, and Maine. The infestations are most severe in portions of northern Idaho and Montana, and in a limited area in northern Minnesota. Populations began to increase in Idaho and Montana some six years ago and the insect is now epidemic on 2,847,000 acres in the two states. There was also an increase in the degree of defoliation in susceptible forest stands in New Mexico, Arizona, and southern Colorado. In Oregon and Washington, however, populations reached their lowest level since detailed records began in 1947 and epidemic infestations decreased from 1,034,440 acres in 1954 to 542,430 acres in 1955. The increased effectiveness of natural control, and the light to moderate intensity of the current infestations, resulted in decisions against continuation of aerial spraying in the Pacific Northwest during 1956. Aerial spraying will be undertaken, however, for control of infestations on more than 1 million acres in Montana, Idaho, and New Mexico. The outbreak conditions on the Keweenaw Peninsula in northern Michigan declined sharply, although heavy defoliation occurred along the Canadian border in Minnesota. A heavier infestation also occurred in northeastern Maine, and as a result of a considerable influx of moths into the Madawaska-Squapan Lake areas, a light to medium defoliation in all of northern Maine is expected during 1956.

BLACK-HEADED BUDWORM, *Acleris variana* Fern. The black-headed budworm outbreak on the Tongass National Forest and Glacier Bay National Monument in Alaska continued to diminish. The outbreak now comprises only 620,000 acres in the vicinity of Icy Strait, but lighter defoliation continued along the west side of the mouth of Glacier Bay. Parasites are believed to be the agents contributing most to the decline of the outbreak and only a few scattered pockets of infestation are to be expected during 1956. There was little or no permanent damage to the hemlock or spruce stands during the course of this epidemic.

JACK-PINE BUDWORM, *Choristoneura pinus* Free. The tree damage that was caused by this insect varied in intensity but defoliation was noticeable throughout most of the Lake States. Populations appeared to be increasing and outbreaks were most severe in open-grown jack pine stands. Heavy infestations occurred over most of three counties in north central Minnesota in Luce County, Michigan, and in portions of Wisconsin.

LODGEPOLE NEEDLEMINER, *Recurvaria milleri* Busck. An epidemic infestation of this important forest insect continued unabated

in portions of Yosemite and Sequoia-Kings Canyon National Parks in California. Severe defoliation of host trees occurred on about 50,000 acres in Yosemite and on 3,000 acres in Sequoia-Kings Canyon. Many of the trees have been killed as a result of defoliation by the needleminer alone, but more important is the weakining effect on the trees which is giving rise to heavy group killing by the mountain pine beetle, *Dendroctonus monticolæ* Hopk. The current needleminer infestations are believed to have started in 1945 and have been on the increase since that time.

FIR NEEDLEMINER, *Epinotia meritana* Hein. Approximately 10,000 acres of a white fir stand at Bryce Canyon National Park, and on adjacent areas on the Dixie National Forest in Utah, were heavily defoliated by this insect. The area of infestation has increased nearly tenfold in the last four years and 90 percent or more of the foliage on some trees has been destroyed. Several attempts have been made to control this infestation, but results have been inconsistent and generally unsatisfactory.

DOUGLAS-FIR TUSSOCK MOTH, *Hemerocampa pseudotsugata* McD. Two outbreaks of this insect occurred in widely separated areas during 1955; one on 9,000 acres in portions of Stevens, Spokane, and Pend Oreille Counties in Washington, and the other on 5,000 or more acres on the Stanislaus National Forest in California. This latter infestation resulted in heavy defoliation and some top-killing of trees in local areas. The outbreak in Washington, however, is believed to be on the wane due to the abundance of parasites.

GYPSY MOTH, *Porthetria dispar* (L.). Heavy tree defoliation resulting from a build-up of gypsy moth population occurred in eastern New York, southwestern Connecticut, and in Vermont. A considerable spread of the moth also occurred to the south and west of the regulated area in New York, northern New Jersey, and northeastern Pennsylvania. It is estimated that this spread increased the total area of infestation in the northeastern states by about eight and three-quarter million acres. The intensity of moth populations in the New England States decreased sharply due to a high incidence of disease, parasites, predators, and large-scale spraying. Aerial spraying also was highly successful in controlling the insect in the infestation area near Lansing, Michigan. Additional infestation in Michigan is now known only at one site approximately 12 miles distant from the sprayed area.

BALSAM WOOLLY APHID, *Chermes piceæ* (Ratz.). Infestations in Pacific silver fir in Washington and Oregon were more extensive and more severe in 1955 than in the past several years. Pronounced tree mortality occurred in the Lewis and Toutle River drainages in Washington and new infestations in stands of alpine fir were recorded on the Mount Hood and Willamette National Forests in Oregon. Mortality of balsam fir was reported from a wide area in Maine, New Hampsh re, and Vermont, but infestations were less severe in New York. Tree damage on the Green Mountain and White Mountain National Forests decreased. Experience indicates that direct measures for control of this insect pest are impracticable; it was encouraging, therefore, to find considerable numbers of predators attacking the aphid in the Mount Hood infestation area in Oregon.

SAWFLIES, *Diprion* and *Neodiprion* spp. A number of species of sawflies occurred in outbreak proportions in several areas in various parts of the country. An unnamed *Neodiprion* species occurred on white fir throughout most of the Sierra Nevada Mountains in California but tree damage resulting from defoliation was not severe. *N. burkei* Midd. occurred in an outbreak on 14,000 acres of lodgepole pine timber in southwestern Yellowstone National Park, Wyoming. Associated with this outbreak is an infestation of what may prove to be *Acleris variana* Fern. in alpine fir. Two other sawfly species, the identity of which are as yet unknown, occurred over 33,000 acres of western larch timber stands in northern Idaho and Montana. *N. sertifer* (Geoff.) populations caused considerable damage to red pine throughout the southern half of lower Michigan, in much of Ohio and Indiana, and in northern New Jersey. Spot infestations have caused serious damage to red pines throughout southeastern Connecticut

for several years and infestations were serious during 1955. An outbreak covering approximately 650 acres in Adams County, Wisconsin, was sprayed in an effort to eliminate the only known infestation in that state. Populations of *D. similis* Htg. were found at high levels in all of northwestern Wisconsin and in many sections of central and east-central Minnesota. *N. americanus americanus* (Roh.) and *N. nanulus nanulus* (Schedl). also caused noticeable defoliation in the Lake States region. *N. lecontei* Fitch defoliated young loblolly pines in a portion of San Augustine County, Texas, and infestations were quite prevalent over much of New York. *N. tædæ linearis* Ross was found in small patches on loblolly pine in Louisiana and in southeastern Texas, and *N. tædæ tædæ* Ross occurred along the larger waterways on the eastern shore of Maryland. This latter infestation, however, appears to be on the decline. *N. pratti pratti* (Dyar.) was abundant over a wide area in central Maryland and caused severe defoliation of Virginia pines. *N. tsugæ* Midd. developed to epidemic proportions on approximately 1.2 million acres between Ketchikan and Wrangell in Alaska. The heaviest defoliation occurred on Revillagigedo Island on the Cleveland Peninsula but, as yet, no permanent injury to the hemlock stands is evident.

LARCH SAWFLY, *Pristiphora erichsonii* (Htg.). Epidemic infestations of this forest insect pest continued in northern Minnesota and moderate to heavy feeding occurred throughout widely separated stands in northern Michigan. Defoliation also occurred in the tamarack stands in northern and central Wisconsin. Tree mortality as a result of defoliation was not widespread and occurred only in "off-site" stands in northeastern Minnesota.

TENT CATERPILLARS, *Malacosoma* spp. Stands of aspen over extensive areas in the southern Rocky Mountains have been defoliated by *M. fragilis* Stretch, each year during the past decade. In some stands where defoliation has been continuous during that period, tree mortality has been severe. An effort is now being made to introduce a polyhedral virus disease into the population in an effort to effect control. Although some six million acres of susceptible host type was defoliated by *M. disstria* Hbn. in New York and northern New England, the outbreak is on the decline and a further reduction in populations is expected. Heavy feeding by this species also occurred over large areas in the Lake States region, particularly in northern Wisconsin where there was severe defoliation on approximately 9 million acres. Moderate to heavy defoliation occurred on 19,000 acres in the Lower Penisula in Michigan and on about 400,000 acres in the east-central part of Minnesota.

EUROPEAN PINE SHOOT MOTH, *Rhyacionia buoliana* (Schiff.). The severity of infestations increased sharply in lower Michigan, southeastern Wisconsin and in Illinois, Indiana, and Ohio. Many of the red pine plantations in the central States region were so severely affected that planting of red pine has been curtailed sharply.

NANTUCKET PINE TIP MOTH, *Rhyacionia frustrana* (Comst.). General observations indicate that this insect is present in almost all of the young pine plantations throughout the southern and southeastern States. It is especially prevalent on poor sites and along roadsides. Heavy infestations were reported on natural loblolly pine seedlings in central Mississippi and in southern Alabama, and on planted slash pine in the vicinity of Athens, Texas, and in northwestern Louisiana.

PITCH PINE LOOPER, *Lambdina athasaria pellucidaria* S. & R. This looper has occurred in outbreak proportions on pitch pine over much of Cape Cod, Massachusetts, and in portions of Connecticut, at periodic intervals for many years. An outbreak which began in 1953 reached epidemic proportions in 1954 and 1955. Although tree defoliation in 1955 was generally lighter than in the previous year, the infestation was widespread and it was necessary to initiate direct measures for control on 223,000 acres.

SADDLED PROMINENT, *Heterocampa guttivitta* (Wlkr.). This insect develops to epidemic proportions in susceptible oak, birch,

beech, and sugar maple stands throughout New York and New England at intervals of about 10 years. Heavy feeding occurred on 23,000 acres in western Massachusetts and on 3,000 acres in Rensselaer County, New York, during 1955. Beech and sugar maple were most heavily fed upon, although oak and birch also were attacked.

BEECH SCALE, *Cryptococcus fagi* (Baer). This insect was present in large numbers on the Green Mountain National Forest in Vermont and caused severe damage to beech in portions of New Hampshire and Maine. The scope of infestations in New York was unchanged from that which occurred in 1954, and infestations were not severe.

Occurrence of Monilia Pod Rot and Other Cacao Diseases in Eastern Panama

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MONILIA pod rot (*Monilia roreri* Ciferri & Parodi) was known to occur only in the northern countries of South America, namely, Colombia, Ecuador, Peru and Venezuela where it is ranked as one of the most destructive diseases of cacao. During a recent survey made in late April and early May 1956, however, this disease was observed in the eastern part of Panama. This appears to be an extension of the known geographic range of this disease and the danger of its further spread constitutes a threat to the cacao cultivation in Central America.

The brief survey in Panama was made in two eastern regions, Comarea San Blas on the eastern end of the Atlantic coast of the country, and Darien Province (Panama Province) situated north of the Panama-Colombia border. In both regions, there were no large cacao plantings found except one located in Darien Province at Paya, a village about ten miles from the border on the Paya River.

Monilia Pod Rot

A pod rot similar to that caused by *Monilia* was first observed on red Forastero (Amelónado) cacao trees during the survey in the Ailigandi area in Comarea San Blas. Since on some affected pods the *Monilia* fungus appeared to have invaded and sporulated on spots previously rotted by anthracnose (*Colletotrichum* sp.), a search for the disease with more characteristic symptoms was made in that area. As a result, pod rot with typical *Monilia* infection was identified.

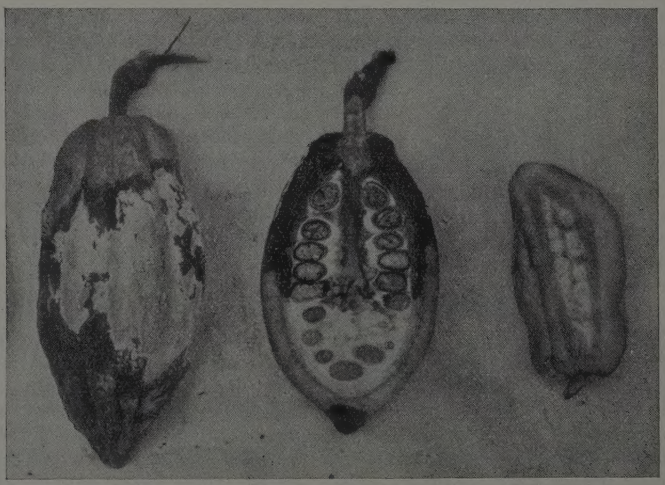

Figure 1. Cacao pod rot caused by *Monilia roreri*, Paya, Darien Province, Panama.

In the Paya area of Darien Province, severe and characteristic *Monilia* infection was again seen. Most of the young and mature pods of the red Forastero cacao were either deformed by the disease or at various stages of rotting (Figure 1). However, the Criollo and Calabacillo cacao trees were not affected at the time of the visit.

Monilia pod rot appears to be a relatively recent introduction in eastern Panama. Although it is difficult to ascertain its origin, the similarity between the Amelonado type of cacao grown in eastern Panama and the same type of cacao affected by the *Monilia* disease in the San Jeronimo-San Vincente region of the Antiquia Department of Colombia suggests that the disease might have been introduced from that part of Colombia into eastern Panama, through the shipment of cacao pods.

The disease seems to have not yet spread into the major cacao-growing regions in the western part of Panama, probably due to the scarceness of cacao pods moving into the west from affected areas where cacao cultivation is rather limited. It has been recommended, however, that the disease survey be extended to include all other cacao-growing areas in Comarea San Blas and Darien Province, as well as in the adjacent Colon Province, to ascertain the range of distribution of Monilia pod rot. Measures to prevent its spread into the large cacao plantings in western Panama are being considered.

Other Cacao Diseases

In the Darien Province, thread blight caused by *Pellicularia* sp., leaf blight and pod rot caused by *Colletotrichum* sp. and few cases of cherelle wilt of physiological origin were observed in the Ailigandi area as well as in the Achutuppu area, which is a forested area about 3 miles south of Ailigandi Island on the Achutuppu River. Those diseases, however, were only of minor importance.

At Puerto Obaldia of the same Province, where only a small planting of Calabacillo cacao was found, all trees were severely affected by marginal and interveinal necrosis, a leaf symptom characteristic of potassium deficiency. The soil in that planting was very shallow and had a rocky subsoil.

In the Paya area of Darien Province, cacao trees of all types (Ca'abacillo, Forastero and Criollo) showed anthracnose infection, pod rot caused by *Phytophthora palmivora* and physiological wilting.

Control of Wild Oats in Denmark

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In spite of timely warnings from the agricultural extension agencies, wild oats, *Avena fatua* (and in rare cases other species of *Avena*), have been spreading in Denmark. [1,2] Surveys have shown that more than 25 percent of the farms have been infested in some provinces. However, in about 70 percent of the infested farms only a few wild oat plants were found. Such lightly infested farms can be cleared of the weed in a few years by annual weeding, provided that oats are not grown as a crop. Winter grains may be grown instead of oats, because, under Danish conditions, wild oats in winter cereals are usually killed by frost. Where conditions permit the weed to propagate, both weeding and more or less radical rotation measures are necessary to control a heavy infestation. Weeding is made easier and more efficient if, when the crop is sown, one seed spout of the drill is closed so as to divide the field into beds. The weed plants should be gathered in a sack and burnt.

Weed killers, such as IPC, TCA or Dalapon (2,2–dichloropropionic acid) cannot be used in cereal fields nor in other crops because of their injurious effects on the growing crops.

In addition to the loss in crop yield due to competition, the presence of wild oats in grain crops causes many other disadvantages and greatly reduces the marketing value of the grain. The infested grain cannot be used for sowing, and the awns and other threshing refuse cannot be used for feed or litter. When the infested grain is used for feeding, the kernels of wild oats are rejected by poultry. Some of the wild oat seeds, after passing through the digestive tracts of livestock, are found in a viable condition in the droppings and constitute a source of new infestation.

[1] INGVARD PETERSEN, H. 1949. Nogle ukrudtsplanters udbredelse og betydning i Denmark (Occurrence and importance of some noxious weeds in Denmark). Tidsskr. Planteavl 52: 461–483.

[2] ——. 1956. Flyvehavre (Wild oats). Landbrugets Informations Kontor.

TABLE 1. *Effects of rotation on the population of wild oats (average results of six field experiments)*

Design of experiment	Crop grown					Number of wild oat plants per square meter	
	1947	*1948*	*1949*	*1950*	*1951*	*1947*	*1951*
No rotation and no weeding	barley	barley	barley	barley	barley	105	211
No rotation but with annual weeding	barley	barley	barley	barley	barley	105	21
Rotation	barley	barley + lucerne	lucerne	lucerne	barley	109	39
Rotation	barley	beets	beets	beets	barley	112	9
Rotation	barley	beets	barley	beets	barley	113	73

Control by Rotation

Proper rotation is one of the most effective means to rid land of a heavy infestation of wild oats. Results of field experiments as summarized in Table 1 show the importance of rotation on the extent of infestation.

Investigations by the Weed Division of the State Experimental Service show that after consecutive cultivation of beets for three years, 90 percent of a known number of wild oat seeds placed in the soil had germinated; after six years of beets no wild oat plants appeared. Beets permit the control of wild oats by mechanical means; winter wheat or clover in combination with grasses is less efficient in the rotation.

Legislative Measures

Danish farmers are usually not in favor of legislative measures for regulating farming or marketing, but in a few important cases they have joined forces with the Government and taken firm steps to protect the interests of efficient farmers against their less progressive neighbours. Such was the case with the Barberry Eradication Act and also with several veterinary measures. In view of the widespread occurrence of wild oats, legislation on the control of this weed is another case that has met with the farmers' approval.

A special act on control of wild oats came into force on 1 June 1956. The act specifies that three times at intervals of at least one week during the month of July all wild oat plants within a distance of 15 meters from the borders of neighboring properties must be rogued and destroyed, or the crop must be mowed down between 1 and 20 June and again between 1 and 15 July. This requirement also applies to roads, railroads and other public properties.

If wild oats are present in grain or straw to be delivered, or on land to be sold or leased, the grower or landowner must state this fact in writing.

Feed grain, whether imported or homegrown, if containing more than two wild oat seeds per kilogram must be ground in a commercial mill: barley to a minimal fineness of 70 (i. e., 70 percent of the ground seeds passing in five minutes through a screen with circular holes 1 millimeter in diameter), oats similarly to a fineness of 55. The same requirement applies to threshing refuse of grain both for feed and seed.

Seed grain, including flax and other oil seeds and pulse, should be free from wild oats and may be delivered as seed only if freedom from wild oats is ascertained and certified by proper field inspection as well as by analysis in an authorized seed testing laboratory. However, seed may be delivered on the basis of the seller's statement and on his responsibility alone. In such a case the buyer or grower who finds new infestation of wild oats after sowing the seed in his field may request arbitration or take the case to a court.

Machines for cleaning and seed disinfection as well as combines and threshers rented from machine stations must be thoroughly cleansed of wild oat seeds before leaving infested properties.

Used sacks, which may have considerable numbers of wild oat seeds sticking to the inner seams and surfaces, must be cleaned thoroughly before being used again for grain, pulse and other plant produce.

Outbreaks and New Records

United States

Plant Pest Control Branch
Agricultural Research Service
United States Department of Agriculture

Extension of Infestations of Mediterranean Fruit Fly in Florida

Following the discovery of the Mediterranean fruit fly (*Ceratitis capitata*) in northwest Miami, Dade County, Florida, on 13 April 1956, infestations have extended rapidly in that State. Recent new infestations, reported between 13 and 19 June include Martin, Pinellas and Hillsborough Counties. This makes a total of 18 counties in which specimens have been found since the initial discovery. Specimens have been taken in the following counties: Dade, Broward, Palm Beach, Hendry, Collier, Sarasota, Lee, Highlands, Polk, Hardee, De Soto, Charlotte, Manatee, Brevard, Indian River, Martin, Pinellas and Hillsborough.

Dade, Broward, Collier, Hendry, Lee and Palm Beach Counties are placed under Federal quarantine and action is being taken to extend the Federal quarantine to include Pinellas County, where a rather general infestation has developed recently along the coastal area. Outside of those three counties only light spot infestations have been found. Immediately upon discovery those spots, with a protective border, are treated with malathion bait spray and State regulations are placed in effect. Products subject to infestation moving from these areas are required to meet the same regulations and treatments as if moving under Federal quarantine.

Western Samoa

B. E. V. Parham
Director of Agriculture, Western Samoa

Occurrence of Bunchy Top of Bananas

The virus disease of bananas known as "bunchy top" has been positively determined as occurring in Western Samoa. Also, the insect vector of this disease, an aphid, *Pentalonia nigronervosa*, has been found in the territory. The latter was determined by B.A. O'Connor, Senior Entomologist of the Department of Agriculture, Fiji.

A field campaign for the control of the vector and eradication of infected plants has been instituted. It is not considered that the disease will seriously affect the overall production of bananas in the territory.

The bunchy top disease has been previously recorded from the South Pacific Islands of Fiji, Ellice and Wallis. The insect vector has been recorded from the Islands of Wallis, Fiji, Tonga and Cook and on one occasion in American Samoa on potted plants. (The above information was received through the South Pacific Commission.)

Plant Quarantine Announcements

Cuba

Resolution No. 745 of 9 May 1956, published in the *Gaceta Oficial* on 15 May 1956, prohibits the importation of fruits and other pulpy vegetable products destined for consumption, when such fruits and vegetable products come from the farms or markets of the State of Florida. All vegetables and fruits imported from other parts of the United States may continue to be imported under existing regulations (Decree No. 2745 of 4 October 1940), but their importation will only be authorized if, when passing through the State of Florida, they are in refrigerated cars sealed at the point of origin and immediately loaded aboard vessels proceeding to Cuba. Airplanes used for all types of air transportation, if passing through a Florida airport, must be fumigated with an insecticide capable of killing the Mediterranean fruit fly before arriving on the coast of Cuba. All holds or refrigerated space in steamers arriving from Florida that transport fresh fruit grown or acquired in Florida, will be sealed while remaining in Cuban ports.

Guatemala

Resolution of the Ministry of Agriculture of 9 April 1956, published in the *El Guatemalteco* Vol. 147, No. 10, 14 April 1956, prohibits the importation of any unmanufactured or unprocessed plant produce originating from Costa Rica, South America, Asia Minor, the Mediterranean area, Canary Islands, Bermuda, Madeira Islands, Azores Islands, Mauritius, Madagascar, New Zealand, Hawaii, Australia, Nigeria and Congo. The importation of fruits and flowers, or parts thereof, originating from Mexico is also prohibited. This Resolution was made for the purpose of preventing the introduction of the Mediterranean fruit fly (*Ceratitis capitata*) and the Oriental white fly (*Aleurocanthus woglumi*).

Jersey (Channel Islands)

Importation of Plants, Seeds and Potatoes (Jersey) Order, 1956, was made by the Committee of Agriculture on 6 April 1956, in pursuance of the *Règlement touchant les maladies et pestes nuisibles aux produits du sol.* For the purpose of that Order, the term "plants" refers to living plants and parts thereof, but excludes fruit, raw vegetables, seeds, potatoes and cut flowers.

Prohibited imports

1. Potatoes grown outside other British Islands and Republic of Ireland.
2. Plants of the following genera or descriptions grown outside the other British Islands and the Republic of Ireland.
   Chrysanthemum
   Castanea spp.
   Pinaceæ: *Abies, Larix, Picea, Pinus, Pseudotsuga, Sequoia, Thuja, Tsuga.*
   Populus spp.
   Quercus spp.
3. All annual and biennial plants from places outside Europe.
4. *Fragaria* spp. and *Rubus* spp. from North America.
5. *Prunus* spp. (including *amygdalus, armeniaca, cerasus, laurocerasus, padus, persica*) from places outside Europe.
6. *Rosa* spp. from Australia, Italy or New Zealand.
7. *Ulmus* spp. from places outside Europe.

Restricted imports from other British Islands and Republic of Ireland

1. Chrysanthemum plants may be imported provided that:
   (*a*) the nursery has been inspected by an officer of the phytopathological service of the country of origin and found to be free of the chrysanthemum gall midge (*Diathronomyia chrysanthemi*); and
   (*b*) the prescribed certificate is furnished.
2. Potatoes may be imported provided that:
   (*a*) they are of a variety immune to wart disease (*Synchytrium endobioticum*);
   (*b*) they have been grown not less than 2 kilometers from any place where wart disease or ring rot (*Corynebacterium sepedonicum*) has occurred at any time;
   (*c*) they are believed to be free from potato root eelworm (*Heterodera rostochiensis*), based upon laboratory examination of soil samples taken from the field and

of soil dropped from the potatoes on the riddling, and upon examination of the growing crop (including root system) within eight weeks after planting; and

(*d*) the prescribed certificate is furnished.

Restricted imports from places outside British Islands and Republic of Ireland

1. Plants, other than those specifically prohibited, may be imported provided that:

   (*a*) they have been examined during the growing season by an officer of the phytopathological service of the country of origin and found to be substantially free from injurious pests and diseases including virus diseases;

   (*b*) they have been grown not less than 2 kilometers from any place where wart disease of potato has occurred during the ten years preceding the date of signing the prescribed certificate;

   (*c*) either the colorado beetle (*Leptinotarsa decemlineata*) is not known to be established within 25 kilometers from the place where the plants have been grown or there is in operation there an intensive control system; and

   (*d*) the prescribed certificate is furnished.

2. Host plants of San José scale (*Quadraspidiotus perniciosus*) may be imported, provided that they have been grown at least 20 kilometers from any place where the scale has occurred during the two years preceding the date of signing the prescribed certificate, or if they have been fumigated before despatch with hydrocyanic acid gas (5 grams per cubic meter; 30 minutes; 7°C.). The requirements for plants in general should also be fulfilled. The host plants of the scale referred to are:

   Acacia spp.
   Amelanchier spp.
   Chaenomeles spp. (incl. *Cydonia japonica*)
   Cotoneaster spp.
   Crataegus spp.
   Cydonia vulgaris
   Fagus spp.
   Juglans spp.
   Maclura aurantiaca
   Malus communis
   Populus spp.
   Prunus spp. (incl. *amygdalus, armeniaca, cerasus, laurocerasus, padus* and *persica*)
   Ptelea trifoliata
   Pyrus spp.
   Ribes spp.
   Rosa spp.
   Salix spp.
   Sorbus spp.
   Symphoricarpus spp.
   Syringa spp.
   Tilia spp.
   Ulmus spp.

3. Seeds may be imported without restriction except in the case of seeds mentioned below, in respect of which requirements as indicated apply:

   (*a*) *Lettuce seed.* The seed-producing crop must have been examined by the phytopathological service of the country of origin and found to be free from lettuce mosaic.

   (*b*) *Tomato seed.* The crop has been examined and found to be free from bacterial canker (*Corynebacterium michiganense*) or has been grown in a region where this disease does not occur.

   (*c*) *Pea seed for sowing.* The crop has been examined and found to be free from bacterial blight (*Pseudomonas pisi*), or has been grown in a region where this disease does not occur.

4. Fruit may be imported without restriction, except those mentioned below.

   (*a*) *Raw cherries from Europe.* Imports are prohibited between 1 June and 30 September from Italy (except the regions of Val d'Aosta, Piedmonte, Liguria, Lombardia, Alto Adige-Trentino, Veneto, Friuli-Venezia, Giulia and Emilia-Romagna), Portugal and Spain; and between 16 June and 30 September from the above-mentioned regions of Italy, southern France (south of latitude 46° N.), Austria, Bulgaria, Hungary and Yugoslavia. From other European countries, each consignment must have been examined by the phytopathological service of the country of origin and found to be free from cherry fruit fly (*Rhagoletis cerasi*), and the prescribed certificate is furnished.

   (*b*) *Apples from U.S.A.* Imports are prohibited between 7 July and 15 November, unless they are of the following grades: U.S. Fancy, U.S. No. 1, Extra Fancy, Fancy. Certificate is required.

5. Lettuce from Europe. Imports are prohibited between 1 March and 15 October from European countries south of latitude 46° N. and between 1 April and 15 October from European countries north of latitude 46° N., unless there has been no outbreak of Colorado beetle during the preceding 12 months within 25 kilometers of the place of origin. Certificate is required.

6. Raw vegetables from Europe. Imports are prohibited between 1 April and 15 October, unless no outbreak of colorado beetle has occurred during the preceding 12 months withis 25 kilometers of the place of origin. This prohibition does not apply to root vegetables free from foliage, and asparagus, aubergines, capsicums, cucumbers, green beans, green peas, marrows, mushrooms, onions and shallots, pimentos, pumpkins, tomatoes and witloof chicory. Certificate is required.

CERTIFICATION. Two forms of phytosanitary certificates are prescribed in the Order. The one identical with the model annexed to the International Plant Protection Convention of 1951 is required for consignments of plants from places outside British Islands and Republic of Ireland. The other, certifying that the plant products described are believed to conform with the current phytosanitary regulations of the importing country, is required in all other cases. Where the language of the country of origin is other than English or French, a translation in English or French should be included. Before the despatch of the consignment, two copies of the certificate should be delivered, one copy to the Committee of Agriculture (6 Bond Street, St. Hélier, Jersey) and the other to the port officer.

Mexico

Resolution of the Department of Agriculture and Animal Husbandry, dated 30 April 1956, extends Foreign Quarantine No. 5 (Decree of 27 January 1936) to prevent the introduction of Mediterranean fruit fly (*Ceratitis capitata*). By that Resolution, the list of territories subject to absolute quarantine for any kind of fruit with soft pericarp and for horticultural products, contained in Foreign Quarantine No. 5, as amended 21 June 1955 (see *FAO Plant Prot. Bull.* 4 : 14.1955.), is extended to the following places:

> Azore Islands, Canary Islands, Portugal, Spain, France, Italy, Hungary, Greece, Malta, Cyprus, Turkey, Syria, Palestine, the African continent with its respective islands, Australia, Tasmania, New Zealand, Brazil, Argentina, Bermuda Islands, Hawaii Islands, Costa Rica, and the State of Florida in U.S.A.

Trinidad

Plant Protection (Temporary) Regulations of 8 May 1956 prohibits the importation from the State of Florida, U.S.A., of fruit (any edible part or product derived from a flower, including tomatoes but excluding nuts, cereals and pulses). Fruit from other parts of the United States may be imported only if they are accompanied by an official certificate delivered by the plant inspection service of the exporting country, stating that such fruit have not originated from, nor passed through, the State of Florida or any other place where the Mediterranean fruit fly has been reported, and that such fruit have been examined at the place of export and are free from diseases and insect pests.

United States

Foreign Plant Quarantine No. 37 concerning nursery stock, plants and seeds was amended by a notice of 17 April 1956, published in the *Federal Register* Vol. 21, No. 77, 20 April 1956. By the amendment, the 23 species of *Rhododendron* imported from Europe, Japan and Siberia are deleted from the list of plants to be grown under post-entry quarantine, in Section 319.37-19 (c) of said Quarantine. A substitution is introduced into the list to the effect that *Rhododendron* spp., including evergreen plants of all species and varieties and any deciduous species or varieties in foliage, when imported from Europe, Asia, New Zealand and North America north of the United States-Canada border, are required to be grown under post-entry quarantine. Deciduous species or varieties not in foliage are excluded from the amendment.

The purpose of this restriction is to prevent further introduction of the rust disease, *Chrysomyxa ledi* var. *rhododendri*. If the U.S. Department of Agriculture acquires conclusive evidence, indicating that this rust does not occur within a country in one of the designated areas and upon the finding that the rust is being prevented entry into that country by adequate plant quarantine measures, provision will be made for the importation from that country of such plants without growing under post-entry quarantine but in accordance with other requirements specified in Quarantine No. 37 with regard to restricted plant material.

News and Notes

Plant Protection Agreement for Southeast Asia and the Pacific

The Plant Protection Agreement for the Southeast Asia and Pacific Region is established for the purpose of promoting inter-governmental co-operation in preventing the introduction of destructive plant diseases and pests from other parts of the world and their spread within the region. The Agreement was drafted by a technical meeting convened by FAO in Singapore, 13-17 December 1954, with ten governments represented and was approved by the Twenty-third Session of the FAO Council on 26 November 1955 as a supplementary agreement under the International Plant Protection Convention of 1951. After its approval it was open for signature by governments which are responsible for international relations of territories in that region.

The Agreement entered into force on 2 July 1956, with the signatures of the following nine governments:

Australia	27 February 1956
Ceylon	27 February 1956
United Kingdom	29 March 1956
Laos	25 May 1956
Netherlands	25 June 1956
Indonesia	28 June 1956
Portugal	2 July 1956
Viet-Nam	2 July 1956
India	2 July 1956

In accordance with its provisions, the Agreement comes into force immediately after three governments have become parties to it. Of the nine governments which have signed the Agreement, the signatures of the United Kingdom, Laos, the Netherlands and Indonesia are subject to ratification. Therefore the Agreement did not enter into force until 2 July 1956 when the representatives of Portugal, Viet-Nam and India signed it.

The Agreement is now open for adherence by non-signatory governments concerned from the date of its entry into force.

International Cereal Rusts Conference

The Third International Conference on Cereal Rusts, organized by the Mexican Ministry of Agriculture and the Rockefeller Foundation, was held in Mexico City, 19-24 March 1956. It was attended by delegates from Australia, Canada, Italy, the United States and ten Latin American countries. A large number of papers of common interest were presented by participants, main topics being:

Concepts and genetical methods for improving rust-resistant varieties of cereals;
Genes and sources of resistance of cereals to rusts and possibility of their utilization to developing improved varieties;
Intergeneric crossing;
Prevalence and potential importance of physiologic races of various cereal rusts;
Physiological aspects of cereal rusts;
Taxonomy and nomenclature of physiologic races of cereal rusts;
Epidemiology of cereal rusts;
Chemical-therapeutical methods of rust control;
Program for international co-operation on cereal rust research;
Problems relating to yellow rust.

During the discussions, certain subjects received special attention and were treated in detail; those included the geographical distribution of the physiologic race 15B of stem rust and its genetical constitution, the sources of resistance which may serve as a basis for the creation of resistant varieties, and the transferring of resistant genes by inter-varietal, inter-specific, or intergeneric cross-beeding. The geographic distribution and seasonal fluctuation of physiologic races were extensively explored. With regard to rust control by chemical means, other than the use of sulphur, no relevant communications were presented to indicate any immediate possibility for their practical application.

It was recommended that close international collaboration with a view to facilitating the exchange of information and material should be established, particularly in connection with the sources of resistance.

It was also proposed that a periodical under the title of Robigo be published to include brief and up-to-date information of scientific findings relating to rust studies.

Two excursions were made during the conference: the first to Texcoco to visit the experimental fields and the laboratories of the Experiment Station " El Horno " and the National School of Agriculture of Chapingo; the second to La Piedad (State of Guanajuate) where the fields of the Experiment Station " La Cal grande " were visited. At the end of the conference an excursion was made to Ciudad Obregon in the State of Sonora where the Mexican, United States and Canadian varieties of cereals were tested.

The first conference was held at St. Paul, Minnesota, 17-18 November 1950, following the widespread occurrence of stem rust race 15B in the wheat-growing areas of the United States and Canada during the summer of 1950. The second conference took place on 5-7 January 1953 at Winnipeg, Manitoba. – C. Sibilia, *Stazione di Patologia Vegetale*, Rome, Italy.

Roma - Tip. del Senato del dott. Giovanni Bardi

A NEW FAO DEVELOPMENT PAPER

Co-operative Marketing for Agricultural Producers

All farmers who are producing more than is needed for their own sustenance, or for sale locally direct to a consumer, must depend on some system of intermediaries to get their produce marketed. A very big farmer, being in a position that enables him to choose amongst the middlemen, may not have to worry about excessive marketing costs, at any rate not to the same extent as the small farmer whose situation in respect of a distant, unknown market is often very weak indeed and is the reason why he may get what seems a disproportionately small share of the ultimate price paid by the consumer. Farmers in this second category are the more numerous in nearly all countries; certainly they are the vast majority if it is world agriculture which is being considered.

Is there anything the small farmer can do to improve his marketing situation? This question can be answered quite confidently: the small farmers' best hope is to co-operate, not informally or only occasionally, but systematically. In joining together to act as a group, small farmers these days do not need to be in doubt as to whether there is a proved system for them to adopt, for already widely varied experience has been accumulated by farmers in many countries who have become members of marketing co-operatives. This method of marketing agricultural produce has been remarkably successful over the past 80 years. Today there is probably not a single agricultural commodity — grain, fruit, vegetable, fiber, nut, sap, or animal or fish product — which is not somewhere being handled by a co-operative.

Generally speaking, the greatest need for co-operative marketing is where there is insufficient competition between private interests to ensure fair prices and good services. Consequently, anyone contemplating the organization of a co-operative should begin by carefully studying the situation to determine whether existing agencies are functioning to the best advantage. Next he should compare it with the potentialities of a co-operative marketing system. To make this comparison correctly it is necessary to know in some detail the nature of a marketing co-operative. Unfortunately, many small farmers often lack such knowledge, and FAO in publishing *Co-operative Marketing for Agricultural Producers* aims to overcome this deficiency.

Co-operative Marketing for Agricultural Producers manages, within the space of 80 pages, to describe in plain language the principles of marketing, how a co-operative is formed, what it does, and its financial requirements. There is a chapter on some of the secondary stages of development, and one entitled "Some Dangers" which warns that marketing is never so simple as it may seem. Before drawing up a set of "Conclusions" a chapter is devoted to illustrations, listing 16 different commodities and for each in turn describing how in actual fact it has been successfully marketed co-operatively.

This booklet, No. 53 in FAO's Development Paper series, should be of value to all who are either themselves small farmers or who are in a position to give them advice. *Co-operative Marketing for Agricultural Producers* can be obtained from FAO Headquarters, Viale delle Terme di Caracalla, Rome, Italy, or through any of the official Sales Agents for FAO publications listed on the back cover of this bulletin.

Price: $ 1.00 or 5s.

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